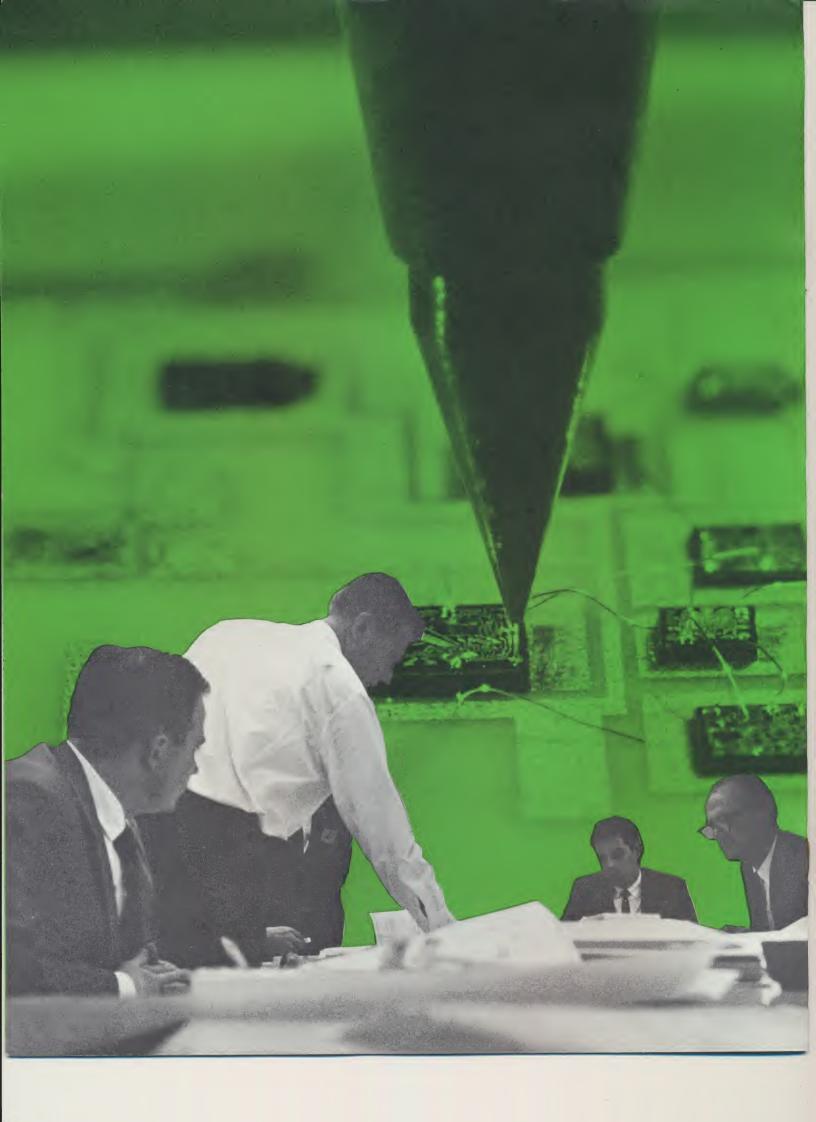
SEMINAR 14 THICK FILM HYBRID TECHNOLOGY JUNE 15-18, 1971

SEMINAR 15 MONOLITHIC IC TECHNOLOGY JUNE 21-24, 1971



IN COOPERATION WITH STATE OF THE ART INC.



DECADE OF DECISION IN MICROELECTRONIC PACKAGING

The cost of packaging tomorrow's microelectronics must and will be lowered by orders of magnitude that few ever thought possible in the sixties. The leaders in this dramatic decade of change will undoubtedly be those who have acquired and maintained a thorough, up-to-date knowledge of the technology. But, rapid expansion and discovery of new techniques make it exceedingly difficult to keep abreast. Unitek Seminars 14 & 15 are intended to meet this need.

Co-presented in cooperation with State of The Art Inc., State College, Pa., a research and educational firm specializing in Microelectronic seminars, these seminars present a fresh, comprehensive look at Monolithic and at Hybrid technologies ... where they've been and where they're going. Each program is presented in a clear, concise manner that gives both a stimulating challenge for the expert and yet lets the newcomer achieve a total grasp of the exciting potential for packaging decision in the decade ahead.

DATES:

Seminar 14 — Thick Film Hybrid Technology June 15-18, 1971 8:30 AM to 5:30 PM Tuesday through Friday

Seminar 15 — Monolithic IC Technology June 21-24, 1971 8:30 AM to 5:30 PM Monday through Thursday

SPONSORED BY:

Unitek Corporation

PLACE:

Westerner Hotel
161 Colorado Place
Arcadia, California 91006

FOR WHOM INTENDED:

Seminar 14: For those engaged or interested in the utilization of Thick Film Hybrid applications and technology and who require a complete knowledge of related economic and design criteria.

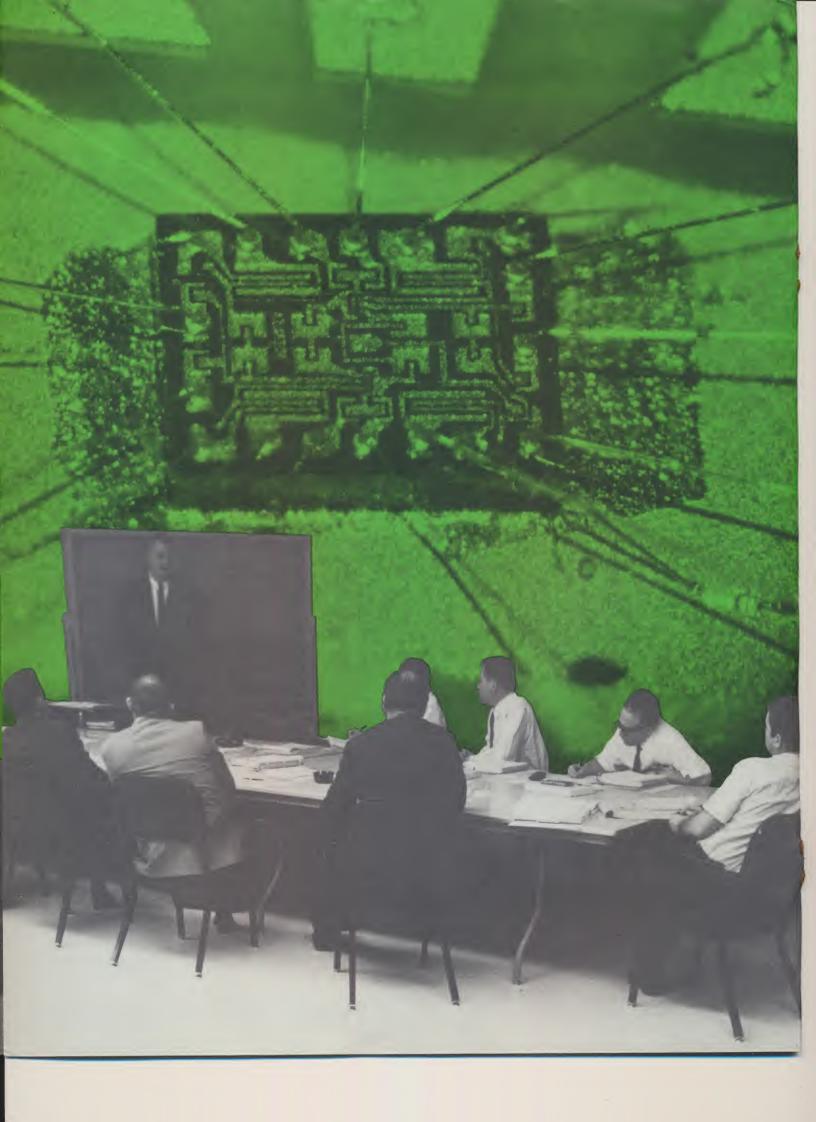
Seminar 15: Individuals interested or engaged in the utilization of Monolithic Integrated Circuit applications and technology. For those who must have thorough understanding of related disciplines as well as the criteria of economics and design.

Program coverage in each seminar will be of timely interest to a wide range of individuals in management, engineering, manufacturing, production, quality control and in sales and marketing.

Content is tailored to meet the needs of those who require fundamentals as well as those who must know the latest technical advances and their implications to specific packaging requirements.

PURPOSE

- To provide a comprehensive presentation and a survey of each subject area.
- To present the state of progress and future expectations for techniques currently under development in both areas.
- To assist in bridging the gap between the development of advanced techniques and their adoption in various potentially important applications.
- To provide the evaluation of the relative merit of various techniques and their relevance to specific packaging requirements.



Staff

Hamer

Hamer

Stach

Staff

Hamer

DESCRIPTION

Unitek Seminars 14 & 15 are based on the premise that product quality and reliability are the direct function of a comprehensive understanding of the technology by those who design, perform and evaluate the work. Emphasis is placed on providing a perspective which encompasses fundamental concepts as well as significant recent developments that tend to shape the future of the technology.

SEMINAR 14 — THICK FILM HYBRID TECHNOLOGY is a concentrated 30 hour program of lecture, panel discussion and laboratory workshops systematically arranged to facilitate rapid but thorough coverage of the entire technology. In addition to a broad market economic survey the program includes coverage of basic thick film materials and processes, resistor design and control, dielectrics, passive/active discrete device considerations, and economic design criteria for optimum package design. Special emphasis is devoted to packaging and packaging schemes. Discussion of bonding and soldering covers conventional die and wire bonding as well as controlled collapse soldering, flip chip, beam lead, spider bonding and other advanced techniques.

Ample time is provided for in-depth review of specific problem areas with the instructional staff. In addition, workshop laboratories provide individual instruction. Participants will actually operate modern screen printing, resistor trimming, firing and bonding equipment to gain practical knowledge of procedures and considerations in producing thick film hybrid microelectronics,

SEMINAR 15 — MONOLITHIC IC TECHNOLOGY represents a concentrated 30 hour program of lecture, panel discussion and laboratory workshops all systematically arranged to enable rapid yet thorough coverage of monolithic technology. Starting with a survey of broad economics the program covers basic IC theory and physics including a look at thick and thin film. Epitaxial theory as well as oxidation, metalization, photolithography and diffusion are included. Next, MOS and then bipolar design and production are covered with special emphasis on packaging considerations. Bonding coverage includes conventional chip and wire bonding approaches and more recent advances such as flip chip, beam lead, spider bonding and others.

Specific problems will be reviewed with ample time by the staff instructors. Workshops enable participants to gain practical understanding of design consideration and procedures in fabricating monolithic integrated circuitry. Individual instruction is included in the operation of modern die bonding, ultrasonic and thermocompression wire bonding and flip chip/beam lead equipment.

Seminars 14 & 15 instructors are working practitioners possessing a depth of technical experience, high professional reputation and a particular distinction for their teaching abilities. An unusual opportunity is offered to engage both formally and informally in a challenging interchange of knowledge and experience with instructors and with other participants.

PROGRAM

JUNE 15, 1971	
Registration	
1. Introduction	
2. Thick Film Processes & Materials	Biggers
3. Thick Film Conductor Compositions	Hamer
4. Thick Film Resistors	Biggers
5. Controlling Resistor Values	Hamer
Panel Discussion	Staff
JUNE 16, 1971	D.
6. Thick Film Dielectrics	Biggers
7. Monolithic & Thin Film ICs	Stach
8. Review of Thick Film Fabrication & Capability Comparison of Thick, Thin & Monolithic	Hamer
Workshop Laboratory	Staff
JUNE 17, 1971	
9. Design & Layout of Thick Film Circuits	Hamer
10. Discrete Devices For Thick Film Circuits	Hamer
11. Bonding & Soldering	Stach
Workshop Laboratory	Staff
Panel Discussion	Staff
JUNE 18, 1971 12. Packaging	Stach
Workshop Laboratory	Staff
13. Thick Film Manufacturing Economics	Hamer
Panel Discussion	Staff
Conclusion	Hamer
Seminar 15 — Monolithic IC Technology	
JUNE 21, 1971	
Registration	
1. Introduction	Hamer
2. Basic Semiconductor Physics	Stach
3. Basics of Thick Film, Monolithic & Thin Film	Hamer
4. Epitaxy — Theory & Practice	Stach
Panel Discussion	Staff
JUNE 22, 1971 5. Oxidation — Theory & Practice	Stach
6. Photolithography	Hamer
7. Diffusion — Theory & Practice	Stach
Workshop Laboratory	Staff
Panel Discussion	Staff
JUNE 23, 1971	
8. Metalization	Hamer
9. Bipolar Device Design & Production	Stach
10. MOS Device Design & Production	Hamer
Workshop Laboratory	Staff
Panal Discussion	Cloff

Panel Discussion

11. Chip & Wire Bonding

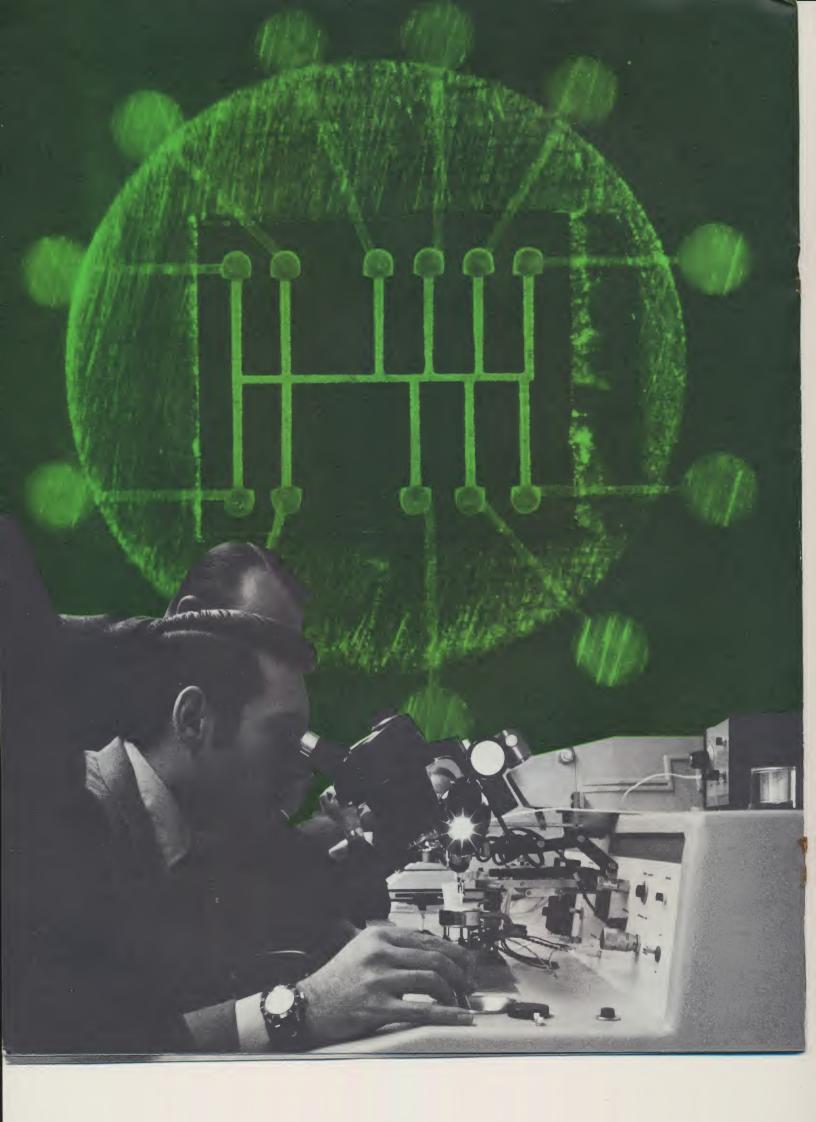
13. IC Facilities Cost

Panel Discussion

JUNE 24, 1971

Conclusion

12. Packaging



INSTRUCTORS

J. V. BIGGERS

DONALD W. HAMER

JOSEPH STACH







J. V. BIGGERS is Assistant Professor of Ceramic Science at
Pennsylvania State University conducting research in ceramic
materials. With over twenty years experience in materials
research and development related to oxides and metals he has
devoted extensive study to phase equilibria, thermodynamics,
electrical measurement, ferroelectrics and materials for thick
film hybrid applications. Previous experience includes
Erie Technological Products, Inc. as Manager of Material
Research. He enjoys extensive industry contact as a Consultant
in ferroelectric materials, oxide ceramics and thick film
technology. His present research efforts are directed toward
study of dielectric saturation in high permitivity ceramics.
He received his B.S. in Chemical Engineering from Purdue
University and his Ph.D. in Metallurgy from Pennsylvania

DONALD W. HAMER is President of State of The Art, Inc., State
College, Pa. His twenty-seven years of experience in electronics
and materials engineering includes Erie Technological Products,
Inc. as Corporate Director of Research and Development,
Director of Erie's Materials Research Laboratory and earlier as
Chief Engineer at Erie's Technical Materials Division. New
product introductions at Erie included multilayer ceramic
capacitors, high voltage ceramic capacitors, alumina substrates
and fired-on precious metals. Other experience includes
Radio Industries (presently part of TRW Electronic Components
Group) and Solar Manufacturing Corporation, Los Angeles,
as Chief Engineer. He received his B.S. in Ceramic Engineering
from the University of Illinois, B.S. in Electrical Engineering
from Pennsylvania State University and his M.B.A. from the
University of Chicago.

JOSEPH STACH is Assistant Professor of Electrical Engineering at Pennsylvania State University in charge of the University Integrated Circuit Laboratory, and Integrated Circuits Programs and courses. He is also actively engaged in Electronics research directed toward MOS field effect transistors and diffusion technology. His eleven years of experience in Electronics Engineering include Bell Laboratories as Design Engineer responsible for design and analysis of IC and devices specifically in the area of digital IGFET ICs. He received his BSEE and MSEE from Newark College of Engineering and his Ph.D. from Pennsylvania State University.

ADMISSION

REQUIREMENTS FOR PARTICIPATION:

There are no formal educational requirements for participation in the course. A desire to contribute to and benefit from a full interchange of knowledge, ideas and experience is considered to be more important than a formal training background.

REGISTRATION:

The fee for each Workshop is \$545. This includes the cost of all required texts and materials, and all noon meals.

ENROLLMENT:

In order that each individual may have maximum opportunity for class participation, enrollment in the workshops is strictly limited. Priority of space will be determined by order of receipt of registration fee. Organizations may exercise the privilege of enrolling unnamed individuals and supply the names and application at a later date. A check or purchase order for the amount of the fee must accompany each enrollment application.

LIVING ACCOMMODATIONS:

A limited number of rooms have been reserved at the Westerner Motor Hotel, 161 Colorado Place, Arcadia, California 91006.

Upon receipt of registration for the workshops, registrants will be sent a reservation card which should be completed and returned to the Westerner. Persons who write direct for reservations should state that they are attending the UNITEK Workshops to insure reservations and rates.

INFORMATION:

Additional information may be obtained by telephoning (213) 358-0123; by TWX 910 585-3236 or by writing UNITEK/WELDMATIC DIVISION, 1820 S. Myrtle, Monrovia, Calif. 91016.

UNITEK CORPORATION WELDMATIC DIVISION 1820 SOUTH MYRTLE MONROVIA, CALIFORNIA 91016

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SEMINAR 15 **MONOLITHIC IC TECHNOLOGY**

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